

Work Order ID 142066

Wednesday, February 24, 2016 11:21:42 AM

142066

U/R

Page 1

Item ID: D412-664-443TRN Accept *N900040100* Setup Start *NS1*
 Revision ID: Stop *NS2*
 Item Name: Crosstube Turning Detail
 Start Date: 3/7/2016 Start Qty: 1.00 *1* Cust Item ID:
 Required Date: 3/11/2016 Req'd Qty: 1.00 *1* Customer:
 Reference: 3/18

Approvals: Process Plan: MLJ Date: FEB 24 2016 Tooling: _____ Date: _____ Run Start *NR1*
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr	Revision Nbr	
D412-664-443	REV A U/R	GK 16/3/4

100	MORI SEIKI CNC LATHE LARGE	0.01							
100									
Mori Seiki	Memo	0.04							
Mori Seiki CNC Lathe Large	1-Cut tube on chop saw, leave extra mat'l for facing. 2-Face tube to length.								

110	QC2- Inspect parts off machine FAI/FAIB	0.00							
110									
QC	Memo	0.00							
Quality Control									

mark
16/03/07

mark
16/03/09

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :				MRB (QSI042) Approval Completed By Lead hand / Supervisor Approval Verification QC / QA Coordinator Approval	
Description Work Order Deviation				Disposition					
Root Cause		FAULT CATEGORY							
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐				
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐				
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐				
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐				
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐				
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐				
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐				
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐				
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐				
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐				
Past Expiry Date ☐	Manufacturing Process ☐								
Misidentified ☐	Past Due ☐	OTHER : _____							

Work Order ID 142066***142066***

Page 2

Wednesday, February 24, 2016 11:21:42 AM

Item ID: D412-664-443TRN

Accept

N900040100Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Crosstube Turning Detail

Start Date: 2/24/2016 Start Qty: 1.00

1

Cust Item ID:

Required Date: 3/11/2016 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

120

0.00

120

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.06

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs on both ends
2-Turn as per Folio FB216
3- File transition lines smooth.
4-Scribe part # as per Dwg D412-664-443
FOLIO REV: N/A
DWG REV: 4

1 0
mml
16/03/09

130

0.00

130

QC2- Inspect parts off machine FAI/FAIB

QC

Memo

0.00

Quality Control

1 0
mml
16/03/15

140

0.00

140

QC8- Inspect parts - second check

QC

Memo

0.00

Quality Control

1 0
DAS
47
9-89
16-03-15

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐																																																																																																																																														
Date :	Step #:	QTY Effective :		MRB (QSI042) Approval																																																																																																																																												
Description Work Order Deviation		Disposition																																																																																																																																														
				Completed By																																																																																																																																												
				Lead hand / Supervisor Approval Verification																																																																																																																																												
				QC / QA Coordinator Approval																																																																																																																																												
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: left;">Root Cause</th> <th colspan="4" style="text-align: left;">FAULT CATEGORY</th> </tr> </thead> <tbody> <tr> <td>Environment ☐</td> <td>☐</td> <td>No Re-verification</td> <td>☐</td> <td>Pressure/Forced</td> <td>☐</td> <td>Temperature/Cure</td> <td>☐</td> <td>Power Loss/Surge</td> <td>☐</td> <td>Positioned Wrong</td> </tr> <tr> <td>Design ☐</td> <td>☐</td> <td>Operator</td> <td>☐</td> <td>Bending</td> <td>☐</td> <td>Set-up</td> <td>☐</td> <td>Folio/Program</td> <td>☐</td> <td>Outside Dimensions</td> </tr> <tr> <td>Doc/Data ☐</td> <td>☐</td> <td>Offset/Setup</td> <td>☐</td> <td>Centre Not Concentric</td> <td>☐</td> <td>BOM/Route</td> <td>☐</td> <td>Grain</td> <td>☐</td> <td>Over/Under tolerance</td> </tr> <tr> <td>Equip/Tooling ☐</td> <td>☐</td> <td>Supplier</td> <td>☐</td> <td>Cracks</td> <td>☐</td> <td>Broken/Damage/Defect</td> <td>☐</td> <td>Weld</td> <td>☐</td> <td>Part Incorrect</td> </tr> <tr> <td>Handling/Pre ☐</td> <td>☐</td> <td>Training</td> <td>☐</td> <td>Crimp/Kink/Ripple/Wave</td> <td>☐</td> <td>Inspection Incomplete/Unqualified</td> <td>☐</td> <td>Wrong Stock Pulled</td> <td>☐</td> <td>Part Lost/Missing</td> </tr> <tr> <td>Material ☐</td> <td>☐</td> <td>Use for Testing</td> <td>☐</td> <td>Cuffs</td> <td>☐</td> <td>Contamination</td> <td>☐</td> <td>Out of Sequence</td> <td>☐</td> <td>Part Moved</td> </tr> <tr> <td>Internal Transport ☐</td> <td>☐</td> <td>Poor Information</td> <td>☐</td> <td>Crushing</td> <td>☐</td> <td>Countersink</td> <td>☐</td> <td>Off-set</td> <td>☐</td> <td>Drawing</td> </tr> <tr> <td>Tribal Knowledge ☐</td> <td>☐</td> <td>Rushing</td> <td>☐</td> <td>Heat Treat</td> <td>☐</td> <td>Cut Too Short</td> <td>☐</td> <td>Mislabeled</td> <td>☐</td> <td>Finish</td> </tr> <tr> <td>LOA ☐</td> <td>☐</td> <td>Product Improvement</td> <td>☐</td> <td>Wave/Twist in Tube</td> <td>☐</td> <td>Instructions Incomplete/Unclear</td> <td>☐</td> <td>Fit/Function</td> <td>☐</td> <td>Misread</td> </tr> <tr> <td>Substation ☐</td> <td>☐</td> <td>Process Improvement</td> <td>☐</td> <td>Marks/Chatter</td> <td>☐</td> <td>Drill Holes</td> <td>☐</td> <td>Misaligned/off center</td> <td>☐</td> <td>Turning Sequence</td> </tr> <tr> <td>Past Expiry Date ☐</td> <td>☐</td> <td>Manufacturing Process</td> <td colspan="8"></td> </tr> <tr> <td>Misidentified ☐</td> <td>☐</td> <td>Past Due</td> <td colspan="8" style="text-align: left;">OTHER :</td> </tr> </tbody> </table>						Root Cause			FAULT CATEGORY				Environment ☐	☐	No Re-verification	☐	Pressure/Forced	☐	Temperature/Cure	☐	Power Loss/Surge	☐	Positioned Wrong	Design ☐	☐	Operator	☐	Bending	☐	Set-up	☐	Folio/Program	☐	Outside Dimensions	Doc/Data ☐	☐	Offset/Setup	☐	Centre Not Concentric	☐	BOM/Route	☐	Grain	☐	Over/Under tolerance	Equip/Tooling ☐	☐	Supplier	☐	Cracks	☐	Broken/Damage/Defect	☐	Weld	☐	Part Incorrect	Handling/Pre ☐	☐	Training	☐	Crimp/Kink/Ripple/Wave	☐	Inspection Incomplete/Unqualified	☐	Wrong Stock Pulled	☐	Part Lost/Missing	Material ☐	☐	Use for Testing	☐	Cuffs	☐	Contamination	☐	Out of Sequence	☐	Part Moved	Internal Transport ☐	☐	Poor Information	☐	Crushing	☐	Countersink	☐	Off-set	☐	Drawing	Tribal Knowledge ☐	☐	Rushing	☐	Heat Treat	☐	Cut Too Short	☐	Mislabeled	☐	Finish	LOA ☐	☐	Product Improvement	☐	Wave/Twist in Tube	☐	Instructions Incomplete/Unclear	☐	Fit/Function	☐	Misread	Substation ☐	☐	Process Improvement	☐	Marks/Chatter	☐	Drill Holes	☐	Misaligned/off center	☐	Turning Sequence	Past Expiry Date ☐	☐	Manufacturing Process									Misidentified ☐	☐	Past Due	OTHER :							
Root Cause			FAULT CATEGORY																																																																																																																																													
Environment ☐	☐	No Re-verification	☐	Pressure/Forced	☐	Temperature/Cure	☐	Power Loss/Surge	☐	Positioned Wrong																																																																																																																																						
Design ☐	☐	Operator	☐	Bending	☐	Set-up	☐	Folio/Program	☐	Outside Dimensions																																																																																																																																						
Doc/Data ☐	☐	Offset/Setup	☐	Centre Not Concentric	☐	BOM/Route	☐	Grain	☐	Over/Under tolerance																																																																																																																																						
Equip/Tooling ☐	☐	Supplier	☐	Cracks	☐	Broken/Damage/Defect	☐	Weld	☐	Part Incorrect																																																																																																																																						
Handling/Pre ☐	☐	Training	☐	Crimp/Kink/Ripple/Wave	☐	Inspection Incomplete/Unqualified	☐	Wrong Stock Pulled	☐	Part Lost/Missing																																																																																																																																						
Material ☐	☐	Use for Testing	☐	Cuffs	☐	Contamination	☐	Out of Sequence	☐	Part Moved																																																																																																																																						
Internal Transport ☐	☐	Poor Information	☐	Crushing	☐	Countersink	☐	Off-set	☐	Drawing																																																																																																																																						
Tribal Knowledge ☐	☐	Rushing	☐	Heat Treat	☐	Cut Too Short	☐	Mislabeled	☐	Finish																																																																																																																																						
LOA ☐	☐	Product Improvement	☐	Wave/Twist in Tube	☐	Instructions Incomplete/Unclear	☐	Fit/Function	☐	Misread																																																																																																																																						
Substation ☐	☐	Process Improvement	☐	Marks/Chatter	☐	Drill Holes	☐	Misaligned/off center	☐	Turning Sequence																																																																																																																																						
Past Expiry Date ☐	☐	Manufacturing Process																																																																																																																																														
Misidentified ☐	☐	Past Due	OTHER :																																																																																																																																													

Work Order ID 142066

142066

Page 3

Wednesday, February 24, 2016 11:21:42 AM

Item ID: D412-664-443TRN Accept ***N900040100*** Setup Start ***NS1***
Revision ID: Stop ***NS2***
Item Name: Crosstube Turning Detail
Start Date: 2/24/2016 Start Qty: 1.00 ***1*** Cust Item ID:
Required Date: 3/11/2016 Req'd Qty: 1.00 ***1*** Customer:
Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____ Run Start ***NR1***
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150		0.00							
150	Large Fab					<u>BL</u>		<u>16/03/16</u>	
Crosstubes	Memo	0.02							
Crosstubes	Grind machining marks smooth longitude way.								
180	QC5- Inspect part completeness to step on W/O	0.00							DAS
180						<u>Q</u>	<u>16-03-16</u>		9
QC	Memo	0.00							9-89
Quality Control									
190	Identify as per dwg & Stock Location: <u>L603</u>	0.00							
190	Packaging					<u>BL</u>		<u>16/03/16</u>	
Packaging	Memo	0.00							
Packaging	LOCATION: <u>LOC14</u> <u>BL</u>								

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐																																																													
Date :		Step #:		QTY Effective :				MRB (QSI042) Approval																																																									
Description Work Order Deviation				Disposition				Completed By Lead hand / Supervisor Approval Verification QC / QA Coordinator Approval																																																									
Root Cause		FAULT CATEGORY																																																															
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐	Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐	Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐	Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐	Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐	Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐	Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐	Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐	LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐	Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐	Past Expiry Date ☐	Manufacturing Process ☐	OTHER : ☐			
Misidentified ☐	Past Due ☐																																																																

Work Order ID 142066

Wednesday, February 24, 2016 11:21:42 AM

142066

Page 4

Item ID: D412-664-443TRN

Accept

N900040100Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Crosstube Turning Detail

Start Date: 2/24/2016 Start Qty: 1.00 ***1***

Cust Item ID:

Required Date: 3/11/2016 Req'd Qty: 1.00 ***1***

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

200

QC21- Final Inspection - Work Order Release

0.00

200

QC

Memo

0.00

Quality Control

MCS

MAR 18 2016

MCS MAR 17 2016

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐			
Date :	Step #:	QTY Effective :		MRB (QSI042) Approval	
Description Work Order Deviation		Disposition			
				Completed By	
				Lead hand / Supervisor Approval Verification	
				QC / QA Coordinator Approval	
Root Cause Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐ No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐		FAULT CATEGORY Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐ Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Misabeled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐			
OTHER : ☐					

Picklist Print

Wednesday, February 24, 2016 11:21:45 AM

Page 1

Work Order ID: 142066

142066

Parent Item: D412-664-443TRN

D412-664-443TRN

Parent Item Name: Crosstube Turning Detail

Start Date: 2/24/2016

Required Date: 3/11/2016

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP REV:A NEW ISSUE 13-09-26 JLM VERIFIED BY:DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6020-160		Manufactured	No				Each	8.0000		1			

D6020-160

Crosstube Material

Location

Loc Qty

Loc Code

HALL

8

126259

1

133623

7

mm L 16/03/07

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :			MRB (QSI042) Approval Completed By Lead hand / Supervisor Approval Verification QC / QA Coordinator Approval		
Description Work Order Deviation				Disposition					
Root Cause Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐ No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐		FAULT CATEGORY Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐ Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Mislabeled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐							
		OTHER : ☐							

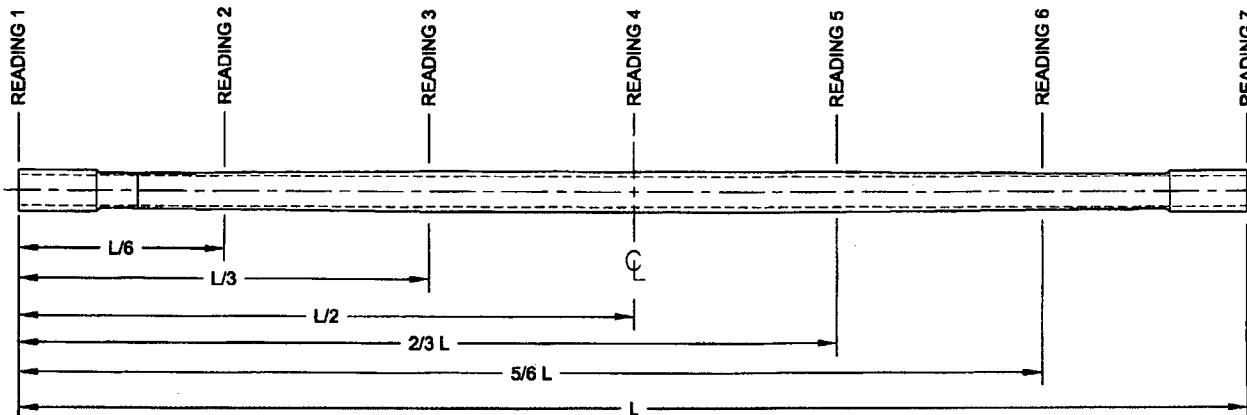
DART AEROSPACE LTD	Work Order: 192066
Description: Crosstube Assembly (412 High Aft SS)	Part Number: D412-664-443
Inspection Dwg: D412-664-443 Rev: A	Page 1 of 2

FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.776	+0.005/-0.000	2.779	/		vern	conc-08
	2.776	+0.005/-0.000	2.780	/			
	2.880	+0.005/-0.000	2.884	/			
	2.990	+0.005/-0.000	2.994	/			
	3.100	+0.005/-0.000	3.105	/			
	3.250	+0.005/-0.000	3.254	/			
	7.980	+/-0.060	8.000	/		vern	conc-08
	0.063	+/-0.010	0.063	/		R.G.	
	0.500	+/-0.010	0.500	/		"	
	2.990	+0.005/-0.000	2.993	/		vern	conc-08
SIDE B	2.776	+0.005/-0.000	2.779	/		vern	conc-08
	2.776	+0.005/-0.000	2.779	/			
	2.880	+0.005/-0.000	2.885	/			
	2.990	+0.005/-0.000	2.993	/			
	3.100	+0.005/-0.000	3.104	/			
	3.250	+0.005/-0.000	3.253	/			
	7.98	+/-0.060	8.00	/		vern	conc-08
	R0.06	+/-0.010	0.063	/		R.G.	
	R0.50	+/-0.010	0.500	/		"	
	Ø2.990	+0.005/-0.000	2.993	/		vern	conc-08
	130.10	+/-0.060	130.100	/		tape	

DART AEROSPACE LTD	Work Order:	142066
Description: Crosstube Assembly (412 High Aft SS)	Part Number:	D412-664-443
Inspection Dwg: D412-664-443 Rev: A		Page 2 of 2

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L=0"	.308	.304	.306	.308	.004	0.073"
READING 2 L=22	.205	.199	.197	.201	.008	
READING 3 L=43	.313	.315	.315	.312	.003	
READING 4 L=65	.433	.435	.438	.434	.005	
READING 5 L=87	.316	.315	.312	.311	.005	
READING 6 L=108	.202	.201	.198	.197	.005	
READING 7 L=130	.308	.308	.305	.304	.004	

Calibration Result

Actual Block Thickness: .100 .500

DAS 47 Sitscan 250 Measured Thickness: .100 .500

Measured by:	<i>mm4</i>
Date:	16/03/15

Audited by:	9-89
Date:	16-03-15

Preliminary Approval:	
Date:	

Rev	Date	Change	Revised by	Approved
A	14.06.24	New Issue (P/O D412-664-403)	KJ	<i>[Signature]</i>

Item	Qty -443	Part Number	Description
1	X	D412-664-443	CROSSTUBE ASSEMBLY (412 HI AFT)
2	1	D6020-132	CROSSTUBE MATERIAL (132" MIN. LENGTH)
3	2	D3595-063-530	RUBBER CUSHION
4	1	D4909-1	SUPPORT
5	2	D4910-1	CHAFING SHIELD
7	4	MS21920-26	CLAMP
8	2	MS21920-28	CLAMP
9	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD
10	A/R	PROSEAL 890	SEALANT

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6020-132
FINISHED LENGTH = 130.10±0.060 (BEFORE BENDING/TRIMMING)
 - 2) FINISH: PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN C6-2, HATCHED AREA)
PAINT OUTSIDE PER DART QSI 005 4.2
AFTER PAINTING, REMOVE MASKING AND APPLY MATTE CLEAR COAT PER DART QSI 005 4.2
 - 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
 - 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
 - 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
 - 6) IDENTIFICATION: SCRIBE DART P/N "D412-664-443" AND B/N ON INSIDE OF CUFF PER DART QSI 044 6.4 (VIBRATING STYLUS)
 - 7) WEIGHT: 80.2 lb AFTER MACHINING
86.7 lb FINISHED WEIGHT
 - 8) PART IS SYMMETRIC ABOUT CENTERLINE.
 - 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- BENDING**
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 7% (BASED ON O.D.) IN LOWER HALF OF R35 BEND AND 6% (BASED ON O.D.) ON REMAINING TUBE.
 - 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038. TO BE PERFORMED AFTER FINAL POST-BEND GRINDING. ANY ADDITIONAL GRINDING REQUIRES ANOTHER LPI INSPECTION.
- ASSEMBLY**
- 12) INSTALL D4909-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015.
 - 13) INSTALL MS21920-28 CLAMPS WITH D3595-063-530 RUBBER CUSHIONS TO SECURE THE D4909-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE ON TOP OF CROSSTUBE SUPPORT.
 - 14) IF NOT ALREADY PRESENT ON CHAFING SHIELD, APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D4910-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEALED D4910-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.
 - 15) TORQUE CLAMPS ON D4909-1 SUPPORT 80 TO 100 IN-LB. TORQUE CLAMPS ON D4910-1 CHAFING SHIELD 40 TO 50 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVES HAVE CURED FOR 24 HOURS.

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 142066 MLS
16-02-24

UNDER REVIEW

UP 15/4/24
LRF 15-561

UNDER REVIEW

UP 17/5/24
LRF 17-691

RELEASED
2014-05-26

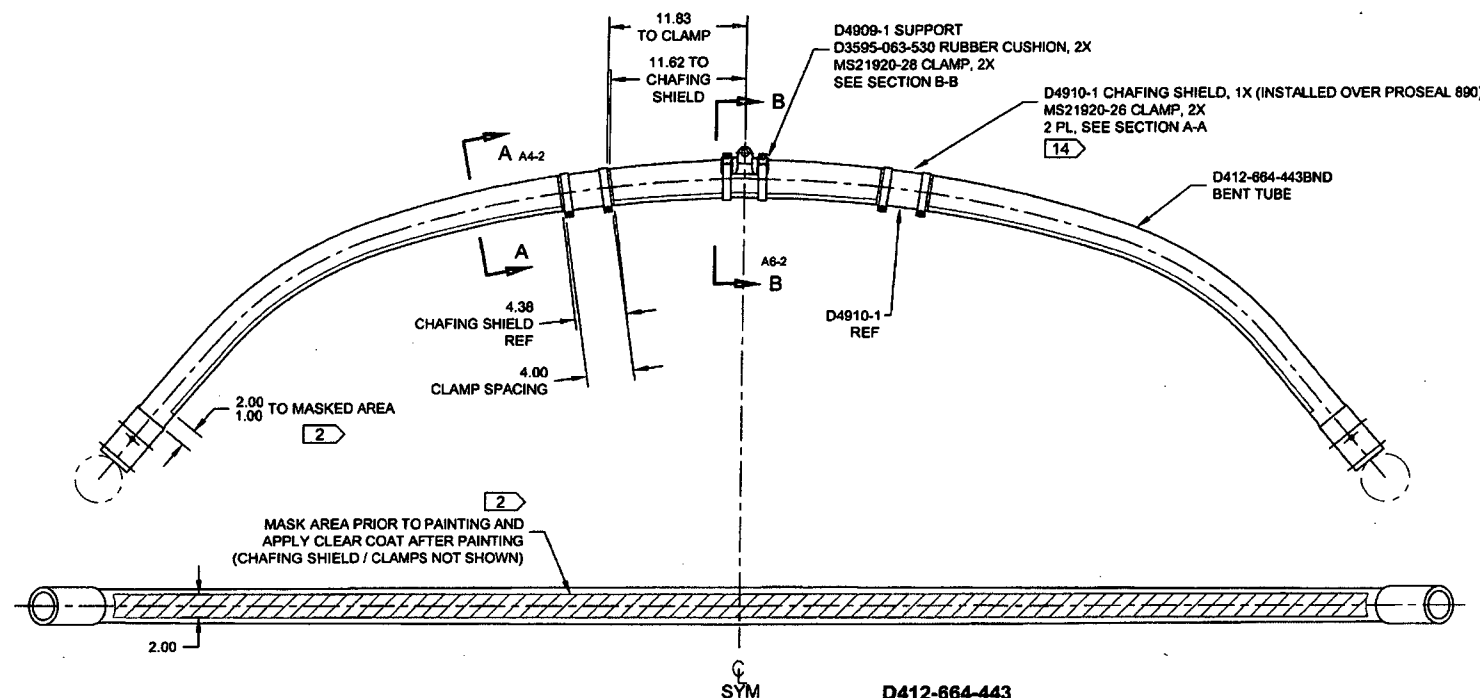
A	NEW ISSUE	CP	14.04.01
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	14.04.01		

DART AEROSPACE LTD
HAWKESBURY, ONTARIO, CANADA

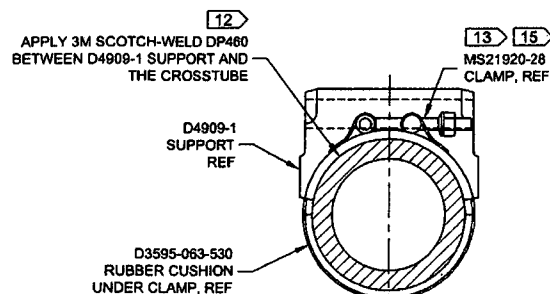
DRAWING NO. D412-664-443
REV. A
SHEET 1 OF 4

TITLE CROSSTUBE ASSY (412 HI AFT)
SCALE NTS

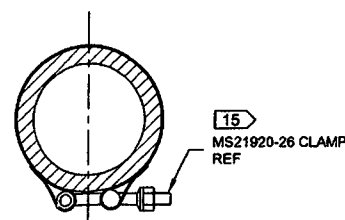
COPYRIGHT © 2013 BY DART AEROSPACE LTD
THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.



D412-664-443
ASSEMBLY DETAIL



SECTION B-B D4-2
SCALE 4X



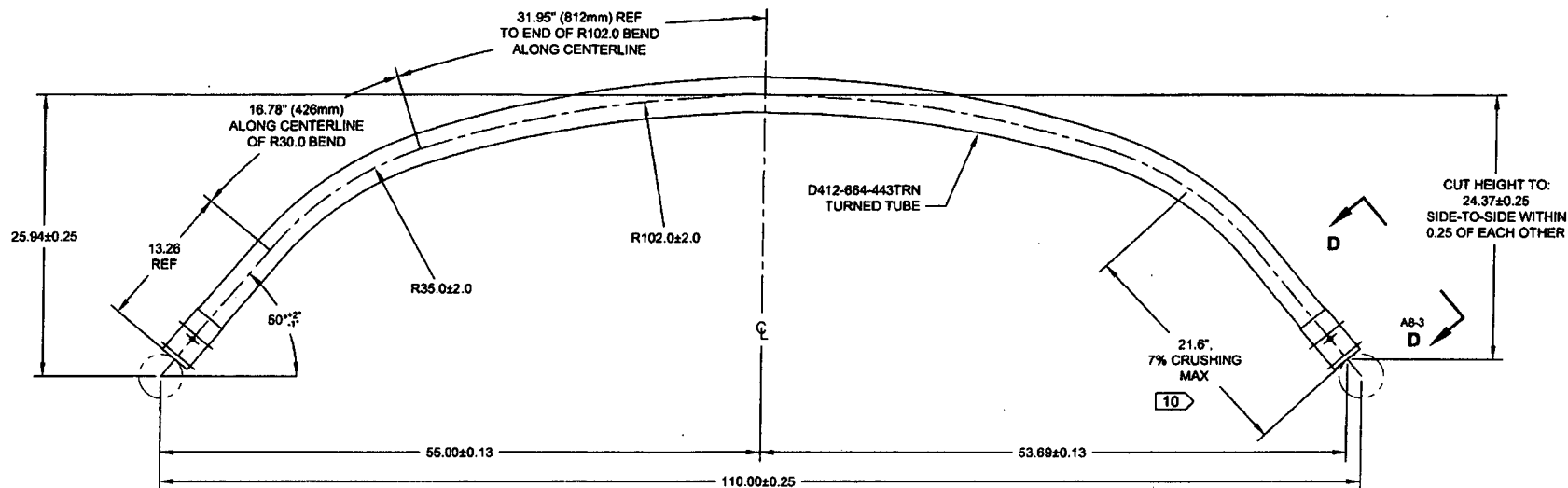
SECTION A-A C6-2
SCALE 4X

UNDER REVIEW
15/4/20

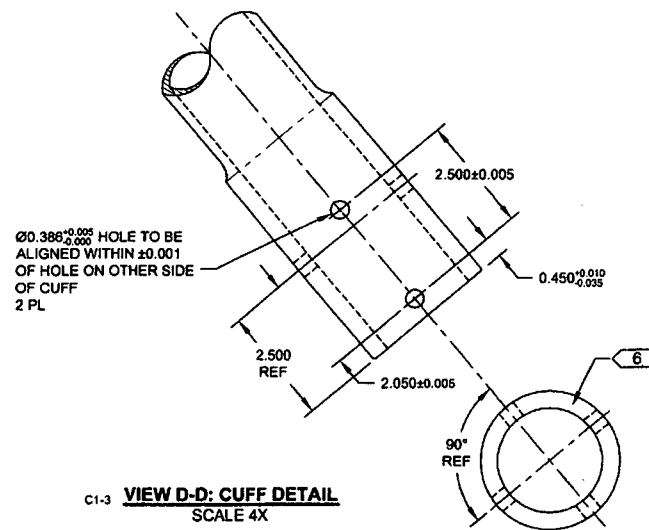
UNDER REVIEW
15/4/20

RELEASED
2014-05-26
MP

DESIGN	<i>JP</i>	DART AEROSPACE LTD	
DRAWN	<i>JP</i>	HAWKESBURY, ONTARIO, CANADA	
CHECKED	<i>Dei</i>	DRAWING NO.	REV. A
MFG. APPR.	<i>JP</i>	D412-664-443	SHEET 2 OF 4
APPROVED	<i>JP</i>	TITLE	SCALE
DE APPR.	<i>JP</i>	CROSSTUBE ASSY (412 HI AFT)	NTS
DATE	14.04.01	COPYRIGHT © 2013 BY DART AEROSPACE LTD	
THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.			



D412-664-443BND
BENDING DETAIL



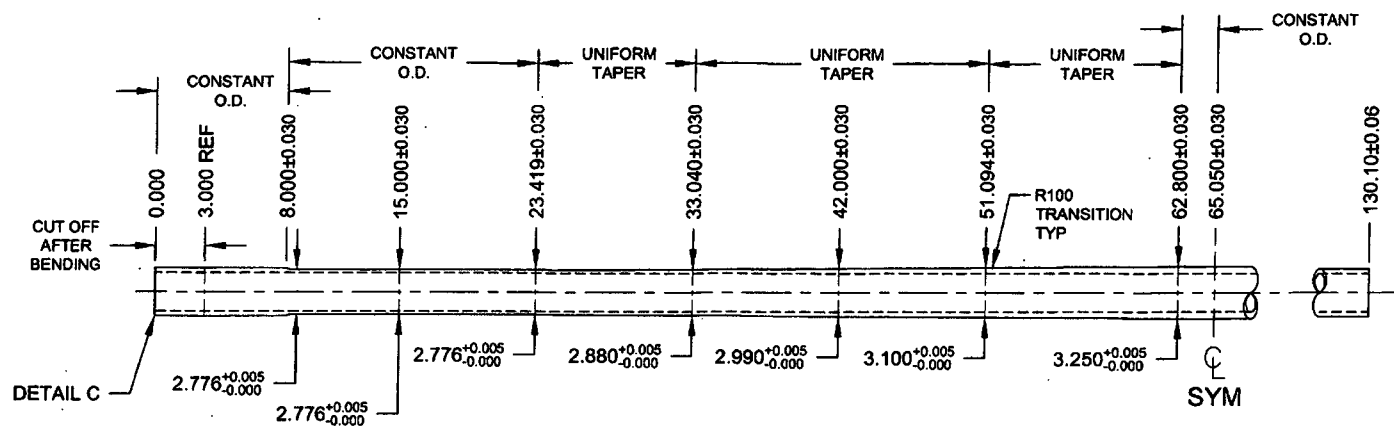
C1-3 **VIEW D-D: CUFF DETAIL**
SCALE 4X

OK
P.H./44
UNDER REVIEW
14/7/30

UNDER REVIEW
15/4/24

RELEASED
2014-05-26
WNP

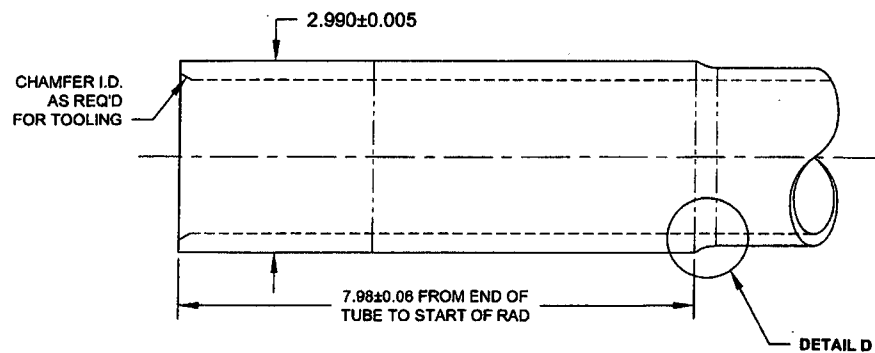
DESIGN	DP	DART AEROSPACE LTD	
DRAWN	DP	HAWKESBURY, ONTARIO, CANADA	
CHECKED	DW	DRAWING NO.	REV. A
MFG. APPR.	AS	D412-664-443	SHEET 3 OF 4
APPROVED	AS	TITLE	SCALE
DE APPR.	AS	CROSSTUBE ASSY (412 HI AFT)	NTS
DATE	14.04.01	COPYRIGHT © 2013 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	



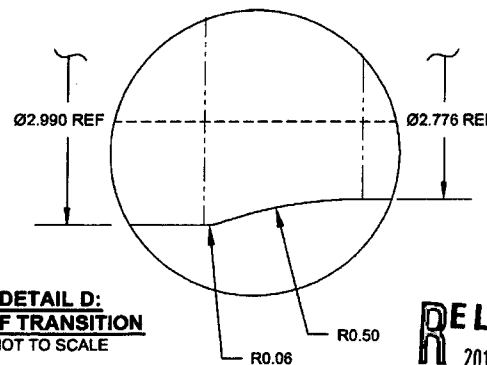
D412-664-443TRN
TURNING DETAIL

UNDER REVIEW

15/4/28



DETAIL C:
CUFF TRANSITION
SCALE 4X



DETAIL D:
CUFF TRANSITION
NOT TO SCALE

RELEASED
2014-05-26

DESIGN		DART AEROSPACE LTD	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. A
MFG. APPR.		D412-664-443	SHEET 4 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
DATE	14.04.01	COPYRIGHT © 2013 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	